Assessment of the Impact of Certain Environmental Stresses on the Radiosensitvity Amongst Radiation Exposed Subjects

A THESIS

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BY

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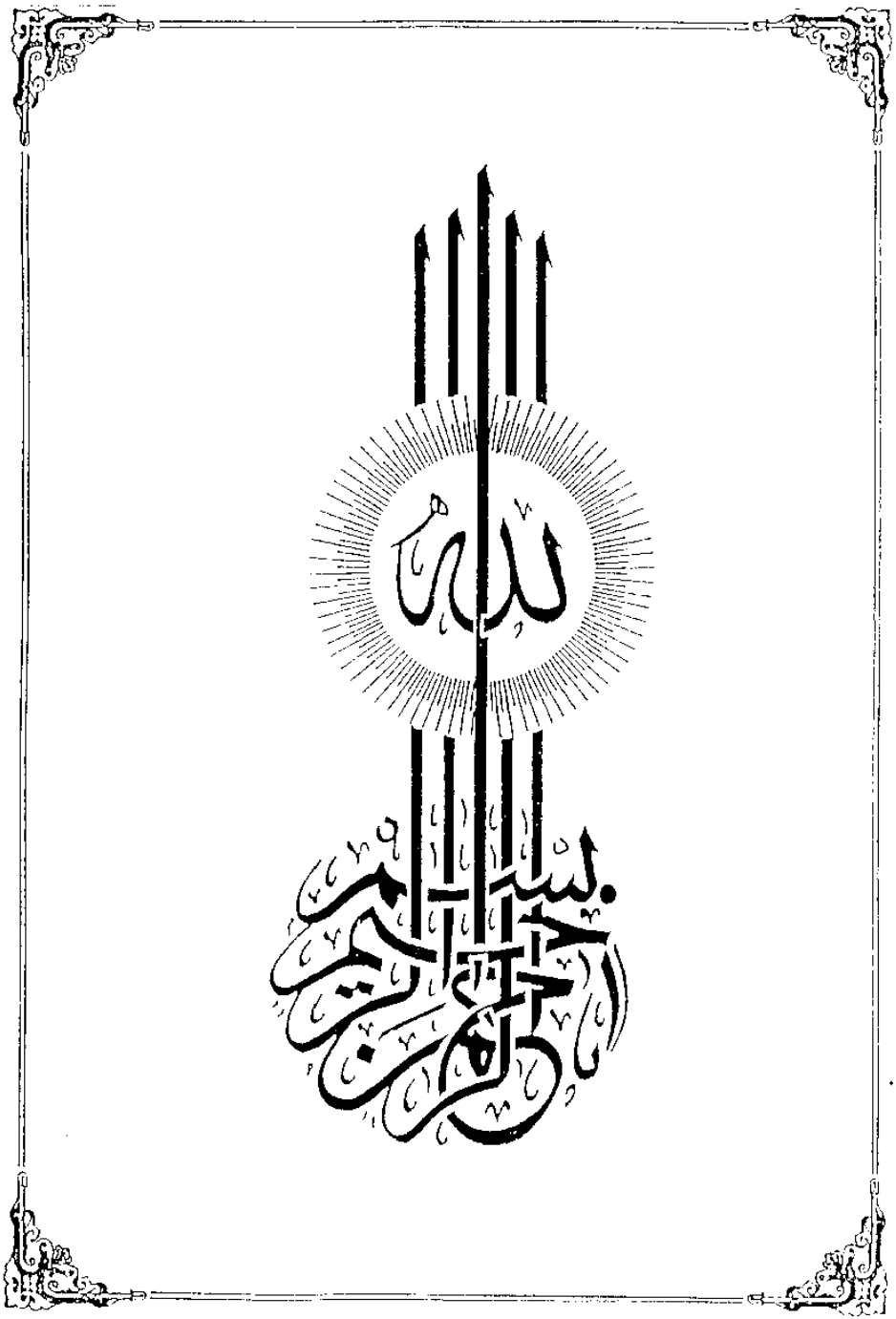

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Higher Studies and Research

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I declare that this thesis has been composed by myself and the work which is recorded has been done by myself. It has not been submitted for a degree at this or any other University.

Azza Abdallah Mohammed

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ABSTRACT

Azza Abdalla Mohammed

Assessment of the impact of certain environmental stresses on the radiosensitivity amongst radiation exposed subjects.

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This study was planned to evaluate the combined effect of exposure to ionizing radiation and exposure to smoking, as environmental stress factors, on the radiosensitivity amongst workers occupationally exposed to radiation. Also the combined effect of exposure to radiation and chemical drugs, as other stress factors, on the radiosensitivity amongst cancer patients therapeutically exposed to radiation has been evaluated.

Certain haematological and biochemical parameters were chosen to be analyzed. These included determination of haemoglobin conc., total leucocytes count and platelet count, as well as the changes in total serum protein, protein fractions and certain blood serum enzymes (AST, ALT, ALP, LDH, CK),representing liver functions and cardiac profile. Also the changes in levels of some hormones representing thyroid and reproductive functions (T_4, T_3 ,TE) were estimated.

The above haematological and biochemical analyses were carried out on 74 Egyptian males, their ages ranged between 25-64 years, and they were classified into 4 main groups: Healthy controls (gr. I), heavy smokers (gr. II), non smoker workers occupationally exposed to radiation (gr. IIIa), radiation exposed smokers (gr. IIIb), cancer patient receiving radiotherapy (gr. IVa) and cancer patients receiving both radio- and chemotherapy (gr. IV b).

The data of this study demonstrated significant elevation in total leucocytic count, serum transaminases, serum alkaline phosphatase and significant decrease in albumin conc., A/G ratio and testosterone levels, as an effect of the combined exposure to ionizing radiation and smoking. On the other hand, significant changes in haemoglobin conc., total leucocytic count, platelet count, total serum protein and certain serum protein fractions were recorded for cancer patients therapeutically exposed to radiation and simultaneously received chemotherapy.

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List of abbreviations

ACTH	Adrinocorticotrophic Hormone
ADP	Adenosine Diphosphate
A/G	Albumin / Globulin ratio
Alb	Albumin
ALP	Alkaline Phosphatase
ALT	Alanine Aminotransferase
AMP	Adinosine Monophosphate
AST	Aspartate Aminotransferase
Bq	Becquerel
BSA	Bovine Serum Albumin
cGY	Centigray
CHD	Coronary Heart Disease
Ci	Curie
CK	Creatine Phosphokinase
COHb	Carboxyhaemoglobin
cpm	Counts per Minute
CVD	Cerebrovascular Disease
DE	Dose Equivalent
DF	Dose Distribution Factor
df	Degree of Freedom
e	Electron
EDTA	Ethylene Diamine Tetraacetic Acid
eV	Electron Volt
G6P	Glucose six Phosphate
GIT	Gastro-intestinal Tract
g/L	Gram per Litre
Glob	Globulin
GM	Geiger-Müller Meter
Gy	Gray (unit of absorbed radiation dose).
Hb	Haemoglobin

HDL	High Density Lipoprotein
HK	Hexokinase
IgA	Immunoglobulin A
IgE	Immunoglobulin E
IgG	Immunoglobulin G
K Bq	Kilo Becquerel
L	Litre
LDH	Lactate Dehydrogenase
LET	Linear Energy Transfer
LSD	Least Significance Difference
m Ci	Milli Curie
μ Ci	Micro Curie
m Sv	Milli Sivert
μ Sv	Micro Sivert
m Sv/y	Milli Severt per Year
Max	Maximum
MB	Maximum Binding
MDH	Malate Dehydrogenase
mg /ml	Milligram per Millilitre
Min	Minimum
ml	Millilitre
mol	Mole
n	Number of measurements
n mol	Nanomole
N.S	Non significant
NADH	Nicotinamide Adenine Dinucleotide (reduced form)
NADP	Nicotinamide Adenine Dinucleotide Phosphate
NCI	National Cancer Institue
NCRRT	National Center for Radiation Research and Technology
ng/ml	Nanogram per Millilitre